Father Secchi; and still a third, independently hit on by several investigators.

In the method ordinarily employed, in order to avoid as much as possible the overlapping of images of sensible breadth (which prevented the white light of the candle flame from giving us even a distant approach to a pure spectrum), the light is allowed to fall on the prism through a very fine slit of a certain height. On this slit an image of the sun is thrown by a fine telescope. If the whole length of the slit is immersed, so to speak, in this image, we shall see nothing but the spectrum of the part of the disc which falls on the slit. If it is only half immersed in it, we shall see less of the spectrum of the disc, but we shall see also the spectrum of the chromosphere, as the obliterating effect of the reflection of the sunlight by our air has been destroyed by the prisms.

This spectrum will consist of bright lines, and if we can manage to place the slit on the precise spot occupied by Venus the lines will be broken, as the chromosphere will be eclipsed in this part by the planet; and we can follow the planet's motion until the break in the line travels down to the spectrum of the sun; this will mark the instant of exterior contact at ingress. At egress the problem is simpler, as the actual place occupied by the planet prior to external contact can be seen by an observer set to watch the sun's image on the slit of the spectroscope.

An obvious objection to this method, if a better one can be found, lies in the fact that Venus has, as it were, to be "fished for" prior to external contact at ingress, and that the slightest error in following the planet's motion would render the mode of observation useless.

The next method is one devised by Father Secchi. Using a spectroscope as before, instead of throwing a simple image on the slit, by an object-glass merely, he throws a spectrum of the sun on the slit by means of prisms, placed either before the object-glass or between it and the slit. He states that by this method the solar disc is seen with its spots and edge quite clearly defined, and that the spectral lines of the chromosphere are also seen. Further, the slit can be opened wider with advantage than under the first method. It is clear, therefore, that when Secchi's method is employed, if it does all that he says it does, observations of exterior contact would be easy.

The third method is a photographic one, and if it succeeds at all would do away with the main objection to the first two. A reference to the candle experiment will make it quite clear. If we imagine for a moment the white light of the ordinary flame of the candle to be abolished, it is clear that we should see nothing but the pure yellow image due to the monochromatic vapour of sodium. Similarly, if we imagine the light of the sun abolished, we should see the whole ring of the chromosphere if we looked at it through a simple prism, *as a ring*, or as a series of rings, according to the kinds of light given out by the vapour of which it is composed (the rings taking the place of the lines when we use a slit). In this way the chromosphere and the coronal atmosphere which lies outside it were actually seen in their true ring-like form by Prof. Respighi and Mr. Lockyer in the Indian eclipse of 1871, the light of the sun being temporarily abolished by the interposition of the moon.

In the third method, then, instead of a slit, a disc is used. All the sun is thus hidden, with the exception of a very small ring at the extreme edge, underlying the chromosphere. It is certain that the whole ring of chromosphere can thus be photographed every day the sun shines, as it is now observed on every such day by Mr. Seabroke at the Temple Observatory at Rugby School; and it is believed that the lower surface of the chromosphere can be thus photographed as *hard* as the outline of the sun itself, for there are many favouring conditions which, however, it would take us too long to enter upon in this place.

It is clear that by the application of this method there is a possibility of obtaining a whole series of photographs both before and after Venus is seen on the sun, and it is also clear that the method can only be tested on the occasion of a transit.

We know that Lord Lindsay's expedition, which has been organised with a completeness which puts our official programme into the shade, is to test Secchi's method, and that Dr. Janssen was to use some spectroscopic combination. The Italian parties, as we have already mentioned, were to limit themselves to external contacts as observed by the spectroscope, but their Government subsidy came so late that it is certain they were not equipped in the most complete manner, and it is probable that their original programme has been considerably curtailed.

Although the spectroscope forms no part of the equipment of the English parties, as it certainly should have done, seeing that they intended to observe contacts more than anything else, we may still hope that some of the methods will have been tested, and that the value of the aid they bring to observations of external contact may be determined.

NOTES

The Belgian Academy of Sciences have conferred upon Prof. Huxley, Sec. R. S., the dignity of Foreign Associate. Such a step on the part of so very Catholic a body may make amends for the anathemas of the Irish prelates.

We are glad to be able to contradict a statement which has appeared in some of the papers that Prof. Bunsen was about to leave Heidelberg. He has, we learn, no intention of doing so. The loss of Professors Kirchhoff and Königsberger is one which this University will feel most severely, and we cannot help wondering what the authorities at Carlsruhe were about to render it possible for two such men to be tempted away. Prof. Kirchhoff has declined the directorship of the Solar Observatory at Potsdam, and goes to Berlin as free Academician and as Professor in the University; Prof. Königsberger has accepted the post of Professor at the large Polytechnic School in Dresden.

The scientific results to be obtained from Arctic exploration will be carefully attended to in making the arrangements for the forthcoming Arctic expedition. Each officer will take up a special branch of scientific investigation, and will devote himself, during the interval between his appointment and the sailing of the expedition, to acquiring such knowledge as will enable him to exert his energies most usefully. There will also be a civilian naturalist or geologist in each ship, who will be carefully selected with reference to special knowledge and other qualifications. It is possible also that an Engineer officer may accompany the expedition, with charge of magnetic and pendulum observations. Some of the men forming the ships' companies will also be selected for their special qualifications. Among these, a dog-driver, named Karl Petersen, formerly cooper at the Danish settlement of Upernavik, has already been entered. There will also be three ice quarter-masters in each ship, chosen from the crews of the whalers, and one of the first duties of Capt. Markham on his arrival in England will be to proceed to Dundee for the purpose of selecting and entering these men. Capt. Markham was telegraphed for to Lisbon on the 20th, and is expected to arrive in London this week.

Lieut. Bellot, brother of the unfortunate Bellot, the Arctic explorer, to whom we alluded in a recent number, has obtained leave from the French Government to volunteer for the English Arctic Expedition.

On Dec. 11, at 4.45 A.M., a severe shock of earthquake was felt by Gen. Wansouty and two friends, who intended to spend the whole of the winter on the top of the Pic du Midi, one of the highest summits of the Pyrenees. It is curious to notice that at the same moment, Dec. 10, 10.30 P.M., a similar shock was felt in America, round Winchester, on the Washington heights, alongside the banks of the Hudson. Are these two commotions related to each other?

The weather has lately been so dreadfully boisterous in the Pyrenean ranges that the Meteorological Observatory situated near the crest of one of the peaks has been almost demolished, Gen. Wansouty and his two friends being obliged to leave the place on the 18th at daybreak. They managed to reach on the same day at midnight, after sixteen hours travelling in the snow, a small inn at Grisp, where they received every attention and were quite safe.

The advices from the south are unanimous in stating that unprecedented masses of snow have fallen, not only in the Pyrenees and the Alps, but also in Spain, where they have put a stop to the warlike operations. On Thursday, Dec. 24, a thaw occurred in Paris, as well as in London and many other places, with an unprecedented rapidity.

The number of railway accidents which befell English travellers on Christmas-eve has created quite a sensation in France. It is worthy of notice that in that country there is a regular staff of accomplished engineers, duly qualified by previous instruction, and paid by the Government to inspect the several lines and ascertain whether all proper measures for security have been taken by the companies. Nothing is left to haphazard, but everything is subject to a close and severe examination. The consequence is, that although the traffic on certain French lines is not less than on some of the main English ones, the accidents are less frequent and not attended with such disastrous results.

In reference to the fact that German plants were found in French soil after the German invasion, we may state that a similar phenomenon has been observed before. *Lepidium draba* was introduced into England by the English troops who failed in the attempt to land on Walcheren in 1809. The gain from the herb was probably greater than the loss from the war. In 1814 many plants from the Don became acclimatised in the Rhone valley and vicinity of Paris. The most notable improvement on record of any spontaneous flora is perhaps the addition to the Alsatian grasses by the introduction of Algerian species. These plants, although coming from a warm climate, have secured a firm footing in their new home, and rendered fertile a number of places which had remained up to that time barren and fruitless.

On Dec. 23, the French Geographical Society, under the presidency of Admiral La Roncière le Nourry, held its annual dinner. Toasts were drunk with enthusiasm to the union of nations by science, and to the crew and officers of the *Challenger*.

At the last meeting of the Paris Academy of Sciences, M. de Lesseps announced the capture of a female shark in the Suez Canal, containing in its abdomen (?) twelve young sharks, all living, and varying in length from twenty to twelve centimetres. This fact, adds M. de Lesseps, tends to show that the shark is truly viviparous.

A few days ago the French Government received from Belgium four hundred carrier pigeons presented by a columbophile of that country. These animals will be sent to the acclimatisation gardens, where a central dove-house is to be erected for the Ministry of War.

In the printed book department of the British Museum, constant complaints have been made for years by the *employes* regarding the injurious effect of the atmosphere on their health. Quite recently Mr. Warren, head of the transcribing department, has died, apparently from no other cause than the poisonous effect of the foul air he was compelled to breathe for many hours every day. His frequent complaints were listened to with apathy by his superiors, and notwithstanding the medical testimony by which he was backed, no attempt was made to remedy the evil. Mr. Warren's is a very hard case. He was only thirty-eight years of age, and leaves a widow and two young children, besides others who were dependent on him for the means of life. He had been in the Museum for twenty years, was a most efficient *employé*, and a general favourite. We hope the attempt which is being made to get a pension for his widow from the Civil List will be successful. He, however, has not been the only sufferer. The young men in his room are all more or less affected, some of them being under medical care. We certainly think that an investigation ought to be made into the justice of the frequent complaints as to the bad ventilation of many parts of the Museum, not even excepting the spacious reading-room. It is even said that had it not been for this cause, the accomplished Emanuel Deutsch might yet have been among us. Indeed, it is hinted that the entire management of the printed book department requires looking into; the public money being by no means spent there to the best advantage.

A very interesting letter appears in Monday's *Times* from a correspondent on board the *Challenger*, describing the voyage from Cape York to Hong Kong. Details are given of visits to several islands in the Malay Archipelago, in which collections of animals and plants were made. The results so far are said to be very satisfactory, and the *Challenger* has arrived in port with every store bottle and case in the ship filled up. With regard to the temperature of these eastern seas visited by the *Challenger*, the *Times* correspondent says:—"They are, in fact, a chain of sunken lakes or basins, each surrounded and cut off from the neighbouring waters by a shallower rim or border. The water, down to a depth equal to that on the border, is able to circulate freely, and gradually cools as we descend; but the whole mass below, having no means of communicating with the outer waters, remains at the same temperature as that of the water flowing over the floor of the rim; or, in other words, the icy-cold water travelling north along the floor of the ocean from the Antarctic Seas, which is found in all the deep open channels, cannot obtain admission through or over the surrounding rim. Thus, we can now affirm with certainty that the sea immediately east of Torres Straits, although having a depth of 2,450 fathoms, is surrounded by an elevated rim, having no deeper water over any part of it than 1,300 fathoms, all the water below that depth being at a steady temperature of 35°. The Banda Sea, which is 2,800 fathoms deep, is cut off at a depth of 900 fathoms; the Celebes Sea, which is 2,600 fathoms deep, is cut off at a depth of 700 fathoms; the Sulu Sea, which is 2,550 fathoms deep, is cut off at a depth of only 400 fathoms, all the water below that depth being at a temperature of 50°. On the other hand, we find that the Molucca passage is open to at least the depth of 1,200 fathoms, and the China Sea to 1,050 fathoms, the greatest depth yet obtained in them."

The following is a list of the Council elected at the recent anniversary meeting of the Institution of Civil Engineers:—President, Thomas Elliot Harrison. Vice-presidents—William Henry Barlow, F.R.S., John Frederick Bateman, F.R.S., George Willoughby Hemans, and George Robert Stephenson. Members—James Abernethy, Sir William George Armstrong, C.B., F.R.S., Sir Joseph William Bazalgette, C.B., George Berkley, Frederick Joseph Bramwell, F.R.S., George Barclay Bruce, James Brunlees, Sir John Coode, William Pole, F.R.S., Charles William Siemens, D.C.L., F.R.S., Sir Joseph Whitworth, Bart., F.R.S., and Edward Woods. Associates—Major J. M. Bateman-Champain, R.E., John Head, and Col. Charles Pasley, R.E.

FROM the Indian papers it appears that the expedition despatched from British Burmah to Yunan was to travel, not by any new route, but by the one which Major Sladen followed some six years ago. It was to start, in fact, from his point of departure, Bhamo, proceeding thence to Momein and Talifu. From the last-named city, once more subject to a Chinese governor, it will sail down the mighty Yangtse, with Shanghai for its final goal. The exploring party is commanded by Col. Horace Browne, one of the most distinguished officers of the Burmah Commission. Mr. Ney Elias is a member of the expedition, and Dr. John Anderson, who goes as scientific officer, with a small staff of Eurasian and native collectors, is already well known as a member of the former expedition to Bhamo and Yunan. If the present party succeed in reaching Shanghai, they will be the first Europeans who, at least since the days of Marco Polo, have ever made their way through China from the West.

IT is with somewhat mingled feelings that we have perused the Report of the "Botanical Locality Record Club" for 1873. Any addition to our knowledge of the geographical distribution of British plants is very valuable, and the Recorder and his correspondents have industriously compiled much useful and interesting observation. But what chance remains of the permanence of our rarer plants when their localities are published in this way? We are glad to find that one of the rarest and most interesting of British plants, the Lady's Slipper, *Cypripedium Calceolus*, has been found in several other localities in the woody magnesian-limestone denes of Durham, besides the original one of Castle Eden; the exact spots are wisely withheld.

MR. R. ROUTLEDGE, B.Sc., F.C.S., has been appointed to the Professorship of Natural Philosophy at the Bedford College, York Place. Lecture rooms and a chemical laboratory fitted with the requisite appliances for the practical teaching of physical science are in course of preparation; but pending the completion of these, arrangements have been made to commence the next session with an elementary course of experimental lectures on heat, in another apartment of the College.

SURGEON-MAJOR DAY, F.Z.S., Inspector of Fisheries in India, has recently issued a second report on the fisheries of India and Burmah, which treats of the sea fisheries of those countries, and of the principal customs affecting the supply of fish. The case of the fisheries in the East is entirely different from that in this country. In India, the chief subject of investigation is how to augment the working of the sea fisheries; in Great Britain, one of the main objects of the Legislature in the various inquiries that have been made has been to see if they were being overworked, and to devise means for their preservation and protection. Although certain customs exist which, if observed on a large scale, would seriously affect the fisheries of India, still the general facts seem to prove that there are not sufficient means for properly capturing and utilising the natural supplies of fish. One of the principal defects is the want of quick means of carriage of the fish to the inland towns; to secure a supply of fish in the interior, it is necessary to salt them, and a great impediment to the trade in salt fish is the Government tax on salt. On this point Dr. Day's remarks are very important. He says: "It may be well to decide whether it is humane or even prudent, in a sanitary point of view, to make the price of salt so excessively high that it cannot be used to preserve fish with, and thus compel the people to go without or consume it putrid or rotten. We read that 'in Bergen there are two large hospitals devoted exclusively to the treatment of patients suffering from a peculiar form of disease brought on by eating badly-cured fish; the disease is a mixture of leprosy and elephantiasis' (both common in Orissa). In Ireland, in 1645, we are told that the leprosy was driven out of Munster by the English, the disease being due to the people eating foul salmon or those out of season. This was prohibited, and the prohibition enforced 'whereby hindering these barbarians against their will to feed on that poisonous meat; they were the cause of that woeful sickness which used so mightily to reign among them, but hath in time been almost abolished.' The collector of Ratnagiri states that the high duty on salt is undoubtedly a source of epidemics and other serious illnesses induced by eating imperfectly prepared fish. I think the foregoing extract sufficient to show that compelling a population to eat rotten fish may be a rather impolitic act."

THE Council of the Society for the Promotion of Scientific Industry, the head-quarters of which are at Manchester, has decided to give gold, silver, and bronze medals for excellence and novelty in the various classes of exhibits at the exhibition of implements, machines, and appliances for the economising of labour, which is to take place in Manchester in 1875. The arrangements for the Exhibition are progressing satisfactorily, and space has been secured by many high-class engineering and other firms.

THE tenth number of the third volume of the Bulletin of the Museum of Comparative Zoology consists of an article on the *Ophiuridæ* and *Astrophytidæ*, old and new, by Theodore Lyman, in continuation and rectification of previous memoirs on the same subject. Many new species are indicated, principally from the Philippine Islands, where they were collected by Dr. Semper, from whom they passed into the possession of the Museum of Comparative Zoology. The memoir is illustrated by seven plates, showing the anatomy of the *Ophiuridæ*, the growth of spines, hooks, and stumps, the formation of armed spines, &c., and the characters of the new species.

THE additions to the Zoological Society's Gardens during the past week include two Hardwicke's Mastigures (*Uromastix hardwickii*) from India, presented by Lieut.-Col. C. S. Sturt; a Nicobar Pigeon ((*Calœnas nicobarica*) from the Nicobar Islands, presented by Capt. R. J. Wimberley; two Bonnet Monkeys (*Macacus radiatus*) from India, presented by Mr. L. Miller and Miss J. Watt; two Mazame Deer (*Cervus campestris*) from South America, purchased; a Paradise Whydah Bird (*Vidua paradisea*), a Pin-tailed Whydah Bird (*Vidua principalis*) from West Africa, received in exchange.

THE PRESENT CONDITION OF THE ROYAL SOCIETY

(*Extracted from the President's Address at the Anniversary Meeting.*)

IT has been represented to me that, the Royal Society being now, after eighteen years of temporary accommodation, settled in quarters of which we hope to retain undisturbed occupation for some generations to come, an account of the present position of the Society in respect of our more important possessions, foundations, and functions, and our relations to the Government, would not only be generally acceptable, but might even be required of me by that large and increasing class of Fellows who live far from our doors. This class now numbers as nearly as possible one half of the Society, few of whom can be even occasional attendants at our meetings; and if to this class of absentees be added the large number of residents within the metropolitan district whose avocations prevent their attending, it will not surprise you to hear that (as I have ascertained by careful inquiry) a very large proportion of our fellow members know little of the Society's proceedings beyond what appears in our periodical publications, nor of our collections, nor of the tenure under which we occupy our apartments under the Crown—and that many have never heard of the funds we administer, whether our own or those voted by Parliament in aid of scientific research, nor of the fund for relief of the necessitous, nor of the gratuitous services rendered by the Society to various departments of the Government.